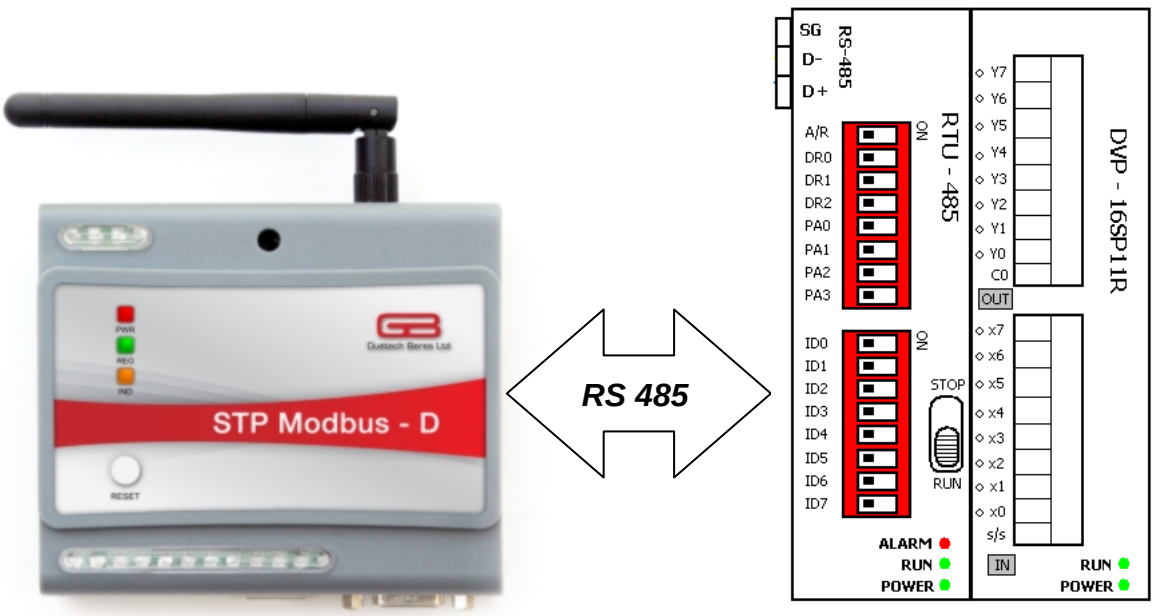
Using STP Modbus-D with Delta I/O Expansion module

Quick Integration Guide



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1. Objective

This document will explain how to configure and establish an RS485 communication between a modbus master (STP Modbus-D) and modbus slave (delta). And creating modbus write and read events using the STP modbus-D Logic flow software.

2. Setting up Delta (slave) devices

2.1 Attaching DVP16SP11R (16 digital I/O expansion device) to RTU485

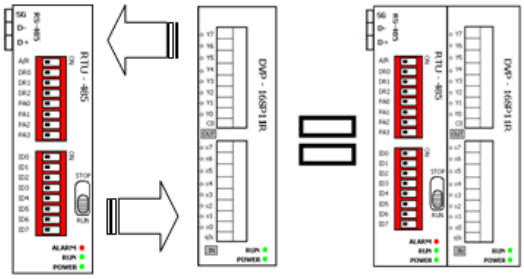


Figure 1: Attaching Digital I/O expansion to DELTA RTU 485

- **RTU485-** configurable modbus slave device with RS485 communication port**.**
- **DVP16SP11R –** an expansion device with 8 digital inputs and 8 digital outputs with no communication port

In order to work with the DVP16SP11R using the modbus protocol, it needs to be connected physically to the RTU485 device. The master will communicate with the DVP16SP11R through the RTU485.

2.2 Configuring and connecting modbus communication

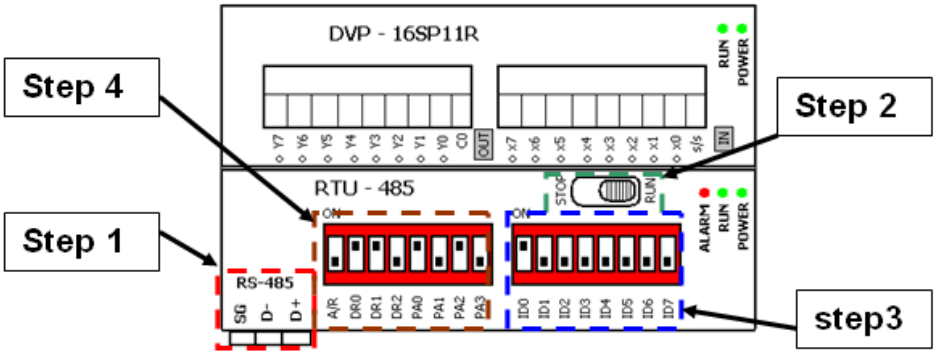


Figure 2: DELTA RTU 485 communication sections

Step 1- Communication port

Connect two bare wires to the **D+** (none inverting) port and **D-** (inverting) port between the **"RTU – 485"** and the **STP Modbus-D** (make sure not to cross connect) using a 2.5 mm flathead screw driver

Step 2- RUN/STOP switch

Set the switch to "**RUN**" mode to enable the Digital I/O ports of the connected devices.

Step 3- Device ID number

Modbus master devices able to recognize every slave device by its unique address number. Set the id number to 1 by moving switch **ID0** to **ON**

Step 4- Communication mode

To configure the device to work in baud rate of **9600 bps**, move switches **DR0** and **DR1** to **ON**.
To configure communication mode **to 8 bit data,1 stop bit and parity even** move switches **PA0** and **PA2** to **ON**. All other switches in this area should remain OFF (down)

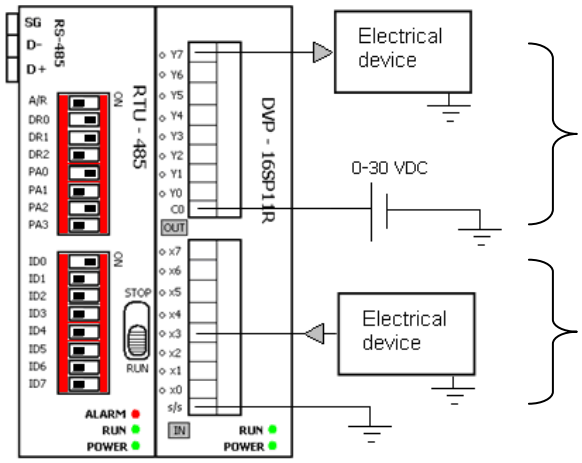
After configuring the switches the device should look like figure 2.
For additional information on communication adjustments, please refer to "RTU 485 user manual" located at: ***www.delta.com***

2.3 Power connection to Delta RTU485

Plug in the power connector to the socket, placed on the side of the unit.
Attach the black wire to the ground of the power supply voltage. The red wire will be connected to the positive voltage (24VDC) of the power supply.
You can leave the green wire unconnected.

Figure 3: Power connection to DELTA RTU 485

2.4 Connecting devices to digital I/O



C0-common
Y0-Y7 – Relay outputs
LOW value= 0 V DC
HIGH value= the DC voltage that is connected to the C0 port. The voltage can range from **0V – 30 V DC**

Digital input values
HIGH to LOW= Less then 8VDC
LOW to HIGH= More then 16.5 VDC

Figure 4: Various devices connected to digital I/O

3. Setting up STP Modbus-D (MASTER) device

3.1 Parameters configuration

1. Connect the **STP Modbus-D** to the computer using the RS232 port.
2. Connect the **STP Modbus-D** to the main power, the red power led should lid.
3. Start the **STP Modbus-D** Logic Flow software.
4. Click on the "**Com port**" icon located on the top left Tool bar.
5. Chose the right communication port from the computer to the device. And click "**Open Port**"
6. Click on the "**Configuration**" in the Tool bar.
7. In the "**APN**" section, write down the **APN** that is related to the connected sim card.
8. In the modbus configuration section set the baud rate value to **9600** as you configured in the slave device.
9. Set the parity type to "**EVEN**" as you configured in the slave device.
10. Push the reset button of the **STP Modbus-D** and right away follow the next instruction.
11. Click on "**Write Configuration To Device**".

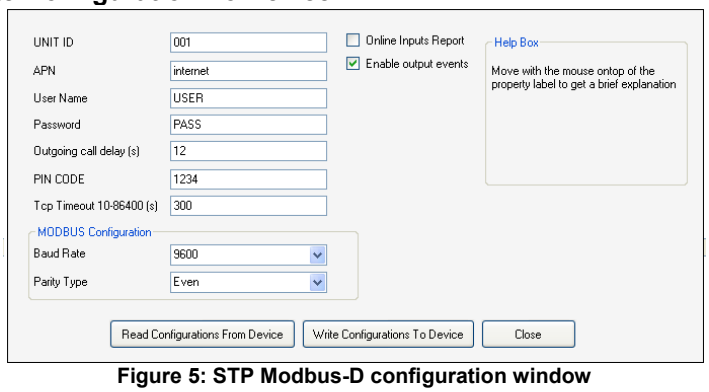


Figure 5: STP Modbus-D configuration window

4. Creating "Modbus Write" event

4.1 Adding "write single output coil" command

1. Click on "**Add Condition**" in the Tool bar.
2. In the input event choose the "**STARTUP**" event.
3. In the output event section, choose the "**MODBUS WRITE**" option.
4. In the command text box choose the "**SINGLE OUTPUT COIL**" for setting out a single digital output.
5. Set the slave id number to **1** as configured in the slave device.
6. In the "**start add**" enter the number **1287**, this number is the digital output address in decimal value.
7. Set the data to be "**HIGH**".
8. Click "**OK**" button if finished.

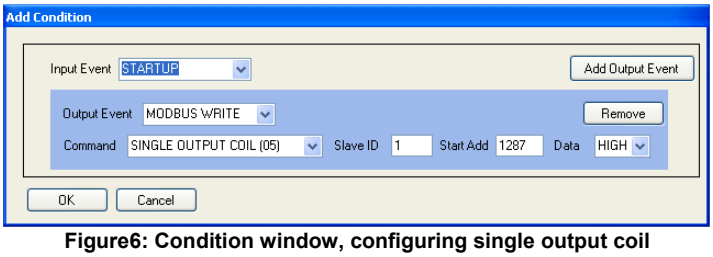


Figure6: Condition window, configuring single output coil

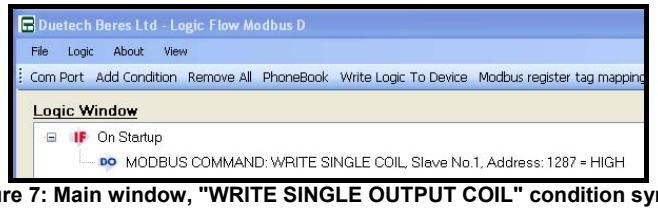


Figure 7: Main window, "WRITE SINGLE OUTPUT COIL" condition syntax

4.2 Adding "write multi output coil" command

1. Click on "**Add Condition**" in the Tool bar.
2. In the input event choose the "**STARTUP**" event.
3. In the output event section, choose the "**MODBUS WRITE**" option.
4. In the command text box choose the "**MULTI OUTPUT COIL**" for setting out a multiple digital outputs.
5. Set the slave id number to **1** as configured in the slave device.
6. In the "**start add**" enter the number 1284.
7. In the "**Num Of Add**" set the **number of addresses** you wish to write, to a value of **4** (**Make sure not to exceed the total available digital output addresses, the counting starts from the "start address" number. in this case it will be up to 1287**)
8. Set the data value in the data field. The data can be written in **decimal** or **binary** or **hexadecimal** format and can be converted to other format by selecting the format in the "**Data Type**" section.
9. Click "**OK**" button if finished.

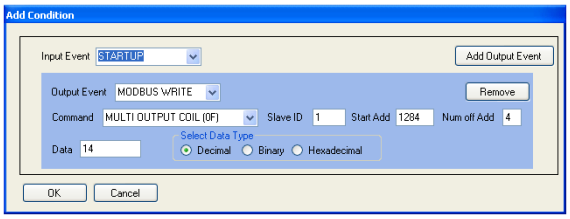


Figure 8: condition window, configuring multi output coil

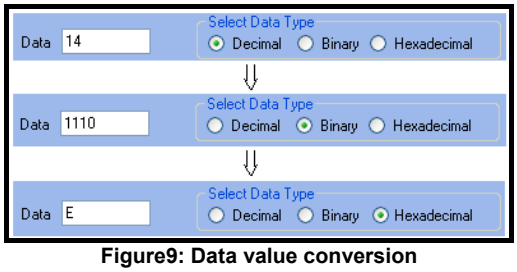


Figure9: Data value conversion

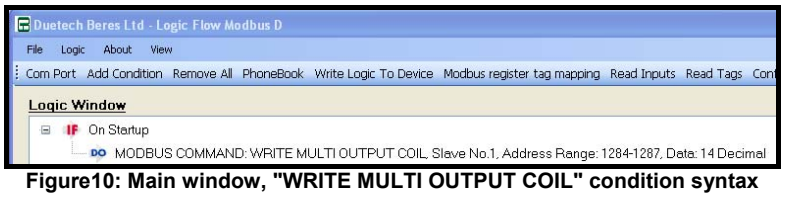


Figure10: Main window, "WRITE MULTI OUTPUT COIL" condition syntax

5. Creating "Modbus Read" event

The **STP Modbus-D** can read reputedly data from the slave address.
Each read command is categorized with a "**Tag**" number. This way the user and the master device are able to determine what kind of response (output event) will be taken due to the data that has just been read.

5.1 Configuring "read commands" from slave digital I/O

1. Click on "**modbus register tag mapping**" located in the Tool bar
2. Select the "**enable**" check box of the selected row.
3. At the "**device id**", select the slave id number **1**.
4. If you wish to read the **digital output** status chose the command "**Read Discrete output coils**" or if you wish to read the **digital input** status chose the command "**Read Discrete input coils**" located in the "**Read command**" text box.
5. Set the starting address you wish to read from in the "**address**" text box.
   - Set digital input address to **1027** (Address range **1024 (DI0)-1031 (DI7)** in decimal value)
   - Set digital output address to **1287** (Address range **1280 (DO0) -1287 (DO7)** in decimal value)
6. Set the tag index number to any number between 1-20. There must be only one of a kind tag index number in the "**modbus register tag mapping**". In this example, set the tag number in the first row to 1, and the second row to 2.
7. Set the **amount of address** to **1** in the "**length**" text box.
8. Close the window by clicking the "**Save and close**" if finished.

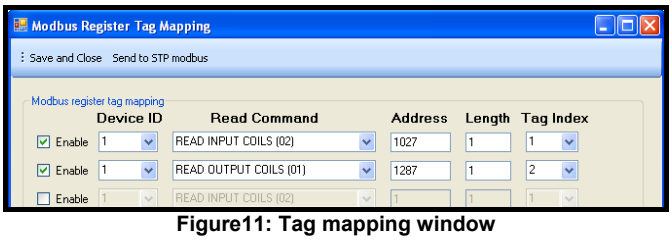


Figure11: Tag mapping window

6. Sending to STP Modbus-D

After configuring the logic flow, the last thing the user needs to do is to send the commands to the STP. This process will burn the logic commands to the device memory and will remain there until the user will send a different logic commands.
To send the logic commands to the STP:

1. Click the "**Write Logic To Device**"
2. Press the reset button on the STP Modbus-D
3. In the "**Flash phonebook**" window, click the "No" button.
4. Wait for the "**flash Success**" window message.
5. Click the "**OK**" button

If you received a notification of "**Flash fail**", redo the process 1 to 5 in this section once more.

7. Display modbus slave incoming data

After configuring the modbus read commands in the tag mapping window
(**See section 4.1**), you can display in real time the data of each referred tag number. To do so:

1. Click on the "**view**" icon located in the menu bar.
2. Click on the "**tag**" option and see that a √ sign is displayed next to it.
3. After the tags have been displayed with a default value of **N/A**, click on the "**Read Tags**" in the Tool bar. The enabled tag numbers will display the data from the modbus device and all other tag numbers will display **N/A**.

8. Additional information

For more additional and extended information of working with the **STP Modbus-D** please refer to the "**STP Modbus-D user manual**".
Using our web site ***www.duetech.gberes.com***
For more information regarding the DELTA modbus slave devices, you could find it in the next link:
www.delta.com